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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Roger G. Stewart

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5649

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EXAMINER

BARTON, JEFFREY THOMAS

ART UNIT	PAPER NUMBER
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1795

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07/28/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/803,543	Applicant(s) STEWART, ROGER G.	
	Examiner Jeffrey T. Barton	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 2-12 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 13-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 22 May 2009 has been entered.

Election/Restrictions

2. Claims 2-12 stand withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species or invention, there being no allowable generic or linking claim. Election was made **without** traverse in the telephone conversation of 10 October 2007 (Confirmed in reply of 17 April 2008) and by original presentation as detailed in the Office Action of 17 December 2008.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1 and 13-18 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter

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which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is no support for the limitation that "the rigid top structure presents a pathway toward the plurality of indentations of no greater than approximately 10 millimeters through which the sunlight passes", as recited in claim 1. No mention or suggestion of any 10 mm threshold is present in the specification as originally filed. Applicant points to portions of the specification teaching a glass plate thickness of "about 8-9 mm", which does not provide adequate support for the range now claimed. It is noted that the "errors of up to ± 1 mm" recited at page 15, lines 17-19 of the specification (Also cited in support of the limitation) refers to misalignment error, not the thickness of the glass plate. In addition there is no support for the limitation that the solid structure is without "significant" gaps or voids. The portion of the specification corresponding to this limitation lacks the term "significant". Claims 13-18 depend from claim 1 and are therefore rejected on the same grounds.

In addition, there is no adequate support for the limitation that "more than half of the incident solar energy concentrated toward at least on photovoltaic cell by the optical lens is delivered within a spot of less than 200 microns diameter of a surface of the at least one photovoltaic cell" recited in claim 14. There is no teaching of such a spot having a diameter 200 microns or less in the specification as originally filed.

In addition there is no adequate support for the limitation that "a first optical device concentrates sunlight onto a larger portion of a second photovoltaic cell" in the

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specification as originally filed as recited in claim 15. The limitation appears to be related to the disclosure of Figure 8 and the associated portion of the specification, but the particular language recited does not find any clear support therein.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1 and 13-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear how large or extensive a gap or void must be to be considered "significant" within the meaning of claim 1. There is no teaching within the specification that shows what is intended by this limitation, and therefore the metes and bounds of the claim are impossible to determine. The claim is therefore indefinite. Claims 13-18 depend from claim 1 and are therefore rejected on the same grounds.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 13, 14, 16, and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Erbert. (US 4,638,110)

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Regarding claim 1, Erbert teaches a photovoltaic device (Figures 1-9) comprising a metallic bottom structure (17a/17b) having a multiplicity of indentations, each of which contains a photovoltaic cell (14); and a rigid top structure (12) containing multiple optical devices as claimed. The thickness of the lens sheet 12 is disclosed as being preferably 1/16 - 1/18 inch. (Column 8, lines 63-68) The top structure is bonded to the metallic bottom structure as claimed. (Column 6, lines 1-7; see also Column 3, lines 1-2) The device is described at Column 4, line 1 - Column 6, line 41.

Regarding claim 13, the optical devices are lenses. (Figures; Column 4, lines 4-8)

Regarding claim 14, the cell sites (22) of Erbert, onto which the light is concentrated (e.g. Figure 6), are disclosed as being about 25-125 micrometers in diameter. (Column 5, lines 37-42)

Regarding claim 16, the claim is essentially directed to the intended use of the device (i.e. temperatures to which a portion of the cell are heated) and adds no further structural limitation to the claim. The metallic bottom layer of Erbert is capable of having temperature uniform within 20 °C. Furthermore, Erbert discloses that the heat generated at the cell sites is well dispersed by the metallic layers (Column 8, lines 7-16), which would not be consistent with temperature gradients beyond 20 °C in the bottom layer. Note that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art

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structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Regarding claim 18, since solar radiation intensity at the Earth's surface is on the order of 1000 W/m^2 and the lens area disclosed by Erbert is about $2.6 - 10 \times 10^{-7} \text{ m}^2$ (Column 8, lines 63-68; corresponding to $0.02\text{-}0.04 \text{ in}^2$), about $2.6 - 10 \times 10^{-4} \text{ W}$ of solar radiation will normally impinge on an individual solar cell of Erbert. Therefore, the power dissipation of the cell will be below 1 W in conventional use. Note also that the claim is directed to the intended use of the device, which is not given undue weight in determining patentability of the claim. As cited above, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Erbert.
(US 4,638,110)

Erbert is relied upon for the reasons given above. The individual lenses of the embodiment of Figures 1-8 concentrate light onto a "portion an individual photovoltaic cell". In addition, Erbert teaches a related concentrator module (Figures 10-12; Column 6, line 43 - Column 7, line 30; Column 8, lines 59-62) with elongated cells having lenses that concentrate light onto larger cell portions that the embodiment of Figures 1-8, described in the rejection above. Erbert also suggests connection of multiple similar inventive concentrator modules in series or parallel. (Column 3, lines 3-6)

Erbert does not explicitly teach a single device where an optical device concentrates sunlight onto a larger portion of a second photovoltaic cell.

However, it would have been obvious to electrically connect a device of the embodiment of Figures 1-8 of Erbert to a device of the embodiment of Figures 10-12 of Erbert in series or parallel, because Erbert suggests such connection between similar photovoltaic modules of his invention. (Column 3, lines 3-6) Such connected modules

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will form a device that includes lenses that focus light onto portions of solar cells having different areas, thus meeting the limitations of the claim.

12. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Erbert (US 4,638,110) as applied to claims 1, 13, 14, 16, and 18 above, and further in view of either Sater (US 4,332,973) or Kaplow et al. (US 4,110,122)

Erbert is relied upon for the reasons given above in addressing claims 1, 13, 14, 16, and 18.

Erbert does not explicitly teach cells including a means for reducing recombination as claimed.

Sater is relied upon as teaching what is conventional in the photovoltaic art, namely that providing appropriate levels of doping at exposed surfaces of silicon solar cells (i.e. n+ doping in an n-type region, p+ doping in a p-type region) is known to provide the advantage of reducing carrier recombination in solar cells. (Column 5, line 62 - Column 6, line 6)

Kaplow et al is similarly relied upon for teaching that providing n+ doping at surfaces of n-type regions in concentrating solar cells is known to reduce carrier recombination in solar cells. (Column 8, lines 1-7)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Erbert by providing n+ and/or p+ doping at semiconductor surfaces of the solar cells, as taught by either Sater or Kaplow et al, because each reference teaches that providing such highly doped regions reduces

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carrier recombination and would thus have been reasonably expected to increase overall device efficiency.

Response to Arguments

13. Applicant's arguments with respect to the previous rejections have been considered but are moot in view of the new grounds of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571)272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeffrey T. Barton/
Examiner, Art Unit 1795
24 July 2009